Claims

1. A porous material wherein silicon carbide particles as an aggregate are bonded with one another via silicon nitride as a binder in such a state that pores are present between the silicon carbide particles, wherein

no columnar silicon nitride (silicon nitride whisker) is formed on the surface of the silicon nitride within each pore, or that,

even when columnar silicon nitride is inevitably formed there, the number of the columnar silicon nitride having a thickness of more than 2 μm and an aspect ratio of less than 10 is greater than that of the columnar silicon nitride having a thickness of 2 μm or less or an aspect ratio of 10 or more.

2. A porous material wherein silicon carbide particles as an aggregate are bonded with one another via silicon nitride as a binder in such a state that pores are present between the silicon carbide particles, wherein the pores have a specific surface area of 1 m^2/g or less.

3. A porous material according to Claim 1 or 2, wherein an open porosity is 40 to 75%.

4. A porous material according to any of Claims 1 to 3, wherein the pores have an average pore diameter of 5 to 50 μm.

5. A porous material according to any of Claims 1 to 4, which has a heat resistance temperature of 1,200°C or more.

6. A porous material according to any of Claims 1 to 5, which has a gas permeability coefficient of 1 μm^2 or more.

7. A method for producing a porous material set forth in any of Claims 1 to 6, wherein the method comprises the steps

of:

mixing at least silica, silicon nitride and a pore former;

firing the resulting mixture at 1,400 to 1,500°C in an inert gas atmosphere or reduced-pressure atmosphere where the oxygen partial pressure is 10 Pa or less to prepare a silicon-silicon carbide porous material; and

nitriding and firing the silicon-silicon carbide porous material at 1,200 to 1,800°C in a nitrogen atmosphere.

8. A method for producing a porous material according to Claim 7, wherein, after preparing the silicon-silicon carbide porous material, the atmosphere used therein is changed to a nitrogen atmosphere without lowering the temperature to room temperature and keeping the temperature at 1,200°C or more, and nitriding and firing the silicon nitride-silicon carbide porous material at 1,200 to 1,800°C in the nitrogen atmosphere is conducted.

9. A method for producing a porous material according to Claim 7, wherein, after preparing the silicon-silicon carbide porous material, nitriding and firing the silicon-silicon carbide porous material at 1,200 to 1,800°C is conducted in a nitrogen atmosphere containing 0.1% by volume or more of hydrogen.

10. A method for producing a porous material according to Claim 7, wherein, after the preparation of the silicon-silicon carbide porous material, the atmosphere is changed to a nitrogen atmosphere containing 0.1% by volume or more of hydrogen (a hydrogen-containing nitrogen atmosphere) without lowering the temperature to room temperature and keeping the temperature at 1,200°C or more, and nitriding and firing the

silicon-silicon carbide porous material at 1,200 to 1,800°C in the hydrogen-containing nitrogen atmosphere is conducted.

11. A honeycomb structure constituted by a porous material set forth in any of Claims 1 to 6.